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ABSTRACT

The operating manual for the Digicassette (or Portable Braille Recorder--PBR), an electronic braille reading and writing machine and an audiotape recorder which is compact and easy to carry around, is presented. Following a preface and an introduction are sections which address the following topics: orientation to parts and functions of the Digicassette; playback or reading a Braille tape; recording (writing) braille; audio recording and playback; alternating braille and sound; machine maintenance; when things go wrong; teaching children to use the Digicassette; the Digicassette and external devices (calculator, typewriter, computer, deaf/blind communication, and copying braille cassettes); and transcriber guidelines. (SB)

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ED207269

Volume III

Appendix 19

Digicassette Operating Manual

Project No. BEH-AH-70171

Evaluation and Research Program for the
Portable Braille Recorder (PBR)

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Division of Media Services

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EC133540

Digicassette Operating Manual

Early 12-cell Display Model

by

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George Peabody College for Teachers
of
Vanderbilt University

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PREFACE

The Digicassette (Portable Braille Recorder or PBR) promises to be among the most useful technological developments to become available to persons who are blind. Similar claims have been made for other developments, but in many cases, the promises have remained unfulfilled due to lack of systematic evaluation and dissemination of information. If the promise of the PBR is to be fulfilled, it will be through such evaluation efforts as have resulted in this operating manual.

The operating manual for the Digicassette is a result of two years of field trial and evaluation efforts with children and adults in Columbus, Ohio and Nashville, Tennessee. Almost fifty different individuals have used the Digicassette as a part of this evaluation project. Extensive data have been obtained on the use of the equipment by many of these persons. We have listened to their comments, observed their behavior, and obtained data on their use of the equipment. Thus, the operating manual is a result of a combination of subjective and objective information obtained in connection with the use of the equipment.

The present manual is actually a revised version of earlier working drafts of instructions for use of the equipment. Nevertheless, we view it as still developmental and subject to revision in light of further experience. Therefore, we solicit comments, suggestions, and questions about the manual in its current form. Such feedback will help us to revise and improve the manual in the future.

Those who have interest in further information about the research which has been the background for the development of this manual should read the entire final report of the evaluation of the equipment.

We are grateful to the many children and adults who are blind who participated in the evaluation study of the Digicassette. We are grateful also to their teachers, supervisors, and employers who facilitated our work by giving us access to the individuals who participated. A number of graduate students both at Ohio State University and at Peabody College provided extensive assistance in research and preparation of the manual.

We are also grateful to the Bureau of Education for the Handicapped, Division of Media Services for supporting the evaluation and research program. Thanks also are due to the personnel of the ELINFA Corporation who provided technical assistance and helped us keep the equipment operational.

We hope this manual and related information about the evaluation and research program will contribute substantially to the education and the employment of persons who are blind. Those of us who have worked in the evaluation program will be amply rewarded in our efforts if children and adults who are blind benefit from this work.

Introduction

The Portable Braille Recorder, (PBR) or Digicassette, is an electronic braille reading and writing machine and an audio tape recorder developed in France by Electronique Linguistique Informatique Appliquees (E.L.I.N.F.A.), Inc. Weighing four pounds and measuring 8 X 9 X 2 inches, the PBR is compact and easy to carry around. Braille typed on a seven-key keyboard is reproduced on a twelve character reading display. Braille is stored on standard audio cassettes as an electronic impulse. A standard 90-minute cassette can contain three hundred thousand braille characters, the equivalent of several braille volumes. Braille is recorded on the tape in sets of 120 characters. Each set corresponds to ten lines of twelve braille characters on the reading display. Each set of 120 characters is referred to as a block of braille. In between blocks of braille are short silent intervals which correspond to the time required to record the block of braille on the tape. When reading, a new set of twelve characters is displayed each time a switch is touched. Thus, the reader controls his reading rates without turning pages or changing volumes.

The PBR can be connected to commonly available pocket calculators, providing a braille readout of the calculator's LED display. The PBR can also serve as a braille computer terminal when interfaced with computer hardware. The PBR is among the most promising technological developments available to persons who are blind.

Technology is advancing at such a rapid rate that it is often difficult to keep abreast of the recent and most current developments in educational equipment, let alone to understand and to use new

devices in one's own classroom. Equipment and devices for the sensorily impaired often seem unduly complex and difficult to operate; teachers' reluctance to use new devices is often the result of unfortunate experiences, mechanical equipment failures, and an overall feeling of "I just don't have the time to learn to use this gadgetry." This is unfortunate since these devices were developed not only to make students' lives easier, but also to make teachers' jobs more rewarding. This manual was designed to provide easy to understand, step by step instructions for operating the Digicassette machine manufactured by ELINFA, Inc. Included in this manual is a wide range of information related to the use of the Digicassette with children and adults in educational, vocational, and technical settings.

This manual offers a step by step approach to learning how to operate and to use the Digicassette machine. Chapters one through five describe, in detail, what the machine looks like, where the controls are, and how to operate it in the braille reading and writing modes and in the audio recording and listening modes. Chapter six discusses the standard procedures necessary for keeping the Digicassette in good working order. Various problems you might encounter will be discussed and solved in chapter seven so that small inconveniences do not become insurmountable difficulties.

Chapter eight describes one possible program for teaching elementary and high school aged children how to use the Digicassette. Since children acquire skills at different rates, the time it will take any one child to learn all the necessary steps in the program will vary. Branching steps may also be necessary for children with multiple handicaps.

Chapter nine outlines many exciting applications of the Digicassette, which can be interfaced (or connected to) many other electronic devices, such as calculators, typewriters, and computers. Expert technical assistance is often required to render existing electronic equipment compatible with the Digicassette, however the basic system arrangement will be discussed.

In chapter ten guidelines for transcribing braille onto cassette tape have been included.

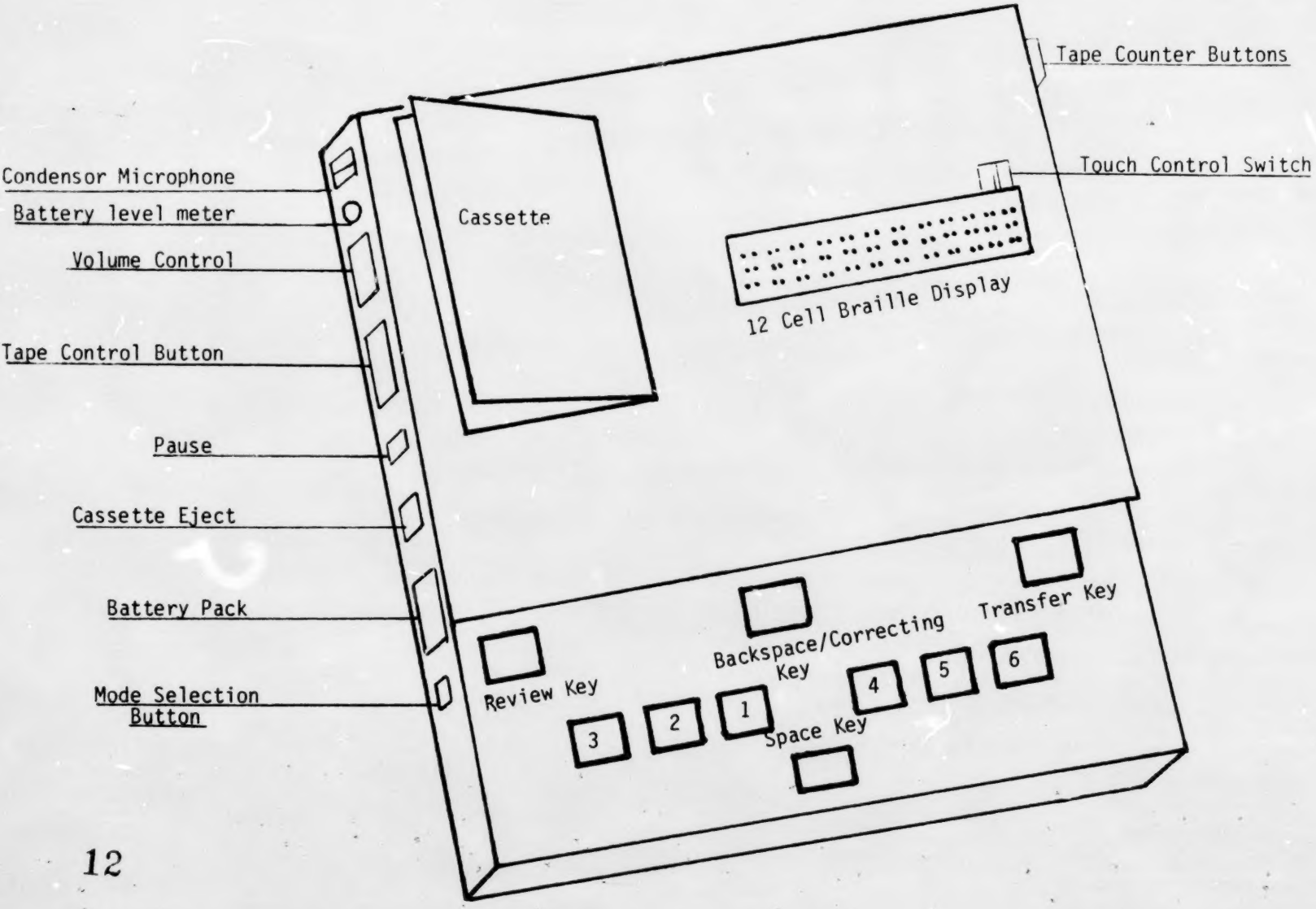
This manual has been reviewed by braille reading students at George Peabody College, Nashville, Tennessee and at Middle Tennessee State University, Murfreesboro, Tennessee, and by braille reading teachers and professionals in Nashville, Tennessee, Austin, Texas, and Clinton, South Carolina. All suggestions and ideas offered by these people have been incorporated into this manual.

I. Orientation to the Digicassette

It is important that you know something about the different parts of your Digicassette before you begin trying to use it for reading and writing essential materials. Read this section carefully, finding each part of your machine as described. Do not begin using this machine for recording or playback purposes until you have familiarized yourself with the Digicassette. Figure 1 is a picture of the Digicassette with all the parts labeled. Refer to this figure while you are reading this section of the manual.

Keyboard

The ten-key keyboard is located near the front of the top panel. (When your Digicassette is placed before you for use,


Tape Counter Buttons
Touch Control Switch
Condensor Microphone
Battery level meter
Volume Control
Cassette
12 Cell Braille Display
Tape Control Button
Pause
Cassette Eject
Battery Pack
Mode Selection Button
Review Key
Backspace/Correcting Key
Transfer Key
3
2
1
4
5
6
Space Key

the bottom row of this keyboard should be closest to you, near the edge of the machine.) The keys are arranged in three rows as follows (moving from left to right of each row):

(a) back row (farthest from you): review key; back space/ correction key; transfer key.

(b) center row: standard braille keyboard - dots 3, 2, 1, 4, 5, and 6

(c) front row (closest to you): space key

Review Key: By pressing this key, you will be able to re-read a 120-character braille block while either writing or reading with the machine. When reading, you will use the review key, along with the transfer key, to find the first block of braille on a cassette.

Back Space/Correction Key: If an incorrect character has been written this key should be pressed until the mistake disappears from the braille display. The correct character can then be written in place of the error.

Transfer Key: When the machine is in the braille mode, this key is used, with the tape control button, for recording, fast forwarding, rewinding, and locating the first block of braille on the cassette. Actual use of this button in various situations will be explained in appropriate sections of this manual.

Standard Braille Keyboard: This keyboard is arranged in the same order as is the keyboard of the Perkins braille writer, except that the space key on the Digicassette is centered in front of the keys for brailling. You should write with this keyboard as you would with

the keyboard of the Perkins braille writer. It should be pointed out, however, that the touch of the Digicassette keyboard is somewhat different from that of the Perkins. Thus, you will have to experiment to find the touch that best works for you to reliably produce the intended braille characters.

Braille Display and Touch Control Switch

The braille display is also located on the top panel to the right of the keyboard and toward the back of the machine (away from you). Even when the machine is turned off, you will be able to feel rough dotting in the area of this braille display. On the display, you will be able to read 12 characters at a time during braille

recording or playback. Reading is always done from left to right.

The touch control switch consists of two flat bars at the end of the braille display line, and slightly behind that display (further away from you). When the area outlined by the bars is touched, the line of braille on the display disappears and is replaced by the next line.

Cassette Holder

The cassette holder is located behind the keyboard, at the left side of the top panel. When the small square pushbutton below this rectangular holder is pressed, the cassette holder opens. A cassette is then placed in the lid and the lid is firmly closed.

Rear Panel

On the back side of the machine (the side farthest from you) in a rectangular-shaped indented area, are four holes or jacks. These jacks, from left to right, are: the external microphone jack, for use with a plug-in microphone; the remote control jack, for use with a two-prong microphone or press-to-operate equipment; an AC adapter jack, for plugging the machine into an electrical outlet; and an earphone jack.

Left Panel

The left side of the machine contains the following parts, moving from front (towards you) to back (away from you):

1. Mode Selector: when this button is in the "out" position, braille may be recorded and read. When this button is in the "in" position (pushed in), the machine may be used for sound recording or sound playback. The position of this button should be checked before the tape is started.
2. Cassette Ejector: this button is also on the left side of the machine, behind and slightly above the mode selector. This button is small and square, and is used to open the cassette holder for inserting and removing cassette tapes.

3. Pause Button: this small, round control will enable you to stop the tape, during sound recording or sound playback, without turning off the machine. This button does not work when the machine is in the braille mode, as movement of tape in this mode is controlled by speed of writing and/or use of the touch control.
4. Tape Control: this large, rectangular switch turns the machine on and off and is used in four different positions: record (when pressed in), playback (when pressed in while machine is turned on its side), rewind (when button is pushed away from you), and fast forward (when the button is pulled toward you).
5. Volume Control: this knob is located below the tape control button, and is used in sound recording and playback. This knob also controls the volume of the buzzing sound heard between blocks during braille reading.
6. Internal Microphone: this is located on the back left corner of the machine. The inclusion of this built-in microphone makes use of an external microphone for sound recording unnecessary.

Right Panel

Braille Tape Counter: these two large square buttons are located to the back of the right side or edge of the machine. When both buttons are pressed and released simultaneously, the counter is set at 000; the numbers will increase automatically as the tape moves forward. When the top button alone is pressed, the current counter number appears on the braille display. When the bottom button is pressed, the counter number is erased from the braille display. This counter may be used when the machine is in fast forward or rewind, in order to find a given place on the tape. It may also be used while the machine is in the recording or playback mode, but the counter number

should always be erased from the display during braille writing so that it will not appear as part of recorded material in a block.

Multi-Pin Connector: this connector, located near the front of the right side of the machine, is used to connect the Digicassette to adapted calculators, typewriters and computers, or other Digcassettes.

Rechargable Battery Pack

Your machine comes equipped with batteries and a built-in charger. When the machine is plugged in to an electrical outlet, the batteries are being recharged. When the Digicassette has been plugged in for five to eight hours, you will be able to use it on battery power for two to three hours. However, it is preferable to use the Digicassette plugged into a wall outlet whenever possible to avoid discharging the batteries. Do not leave your machine plugged in for more than eight hours at a time; overcharging the batteries may cause them to malfunction.

Cassettes

Standard audio cassettes of any brand and length (30-, 60-, 90-minutes) may be used with the Digicassette. However, good quality cassette tapes, and often the more expensive tapes, have been found to last longer with constant use. Most audio cassettes contain several inches of blank tape, or leader tape, on which signals cannot be recorded at the beginning of the tape. Fast forwarding the tape until the leader is past, usually about two seconds, avoids the problem of not recording the beginning of the message. However, leaderless cassette tapes can be purchased if desired.

At the present time, pre-recorded braille reading cassettes are not available for purchase. However, several agencies are

investigating ways in which materials can be brailled onto cassettes and distributed. One exciting possibility being explored involves using computer-generated tapes from the American Printing House for the Blind and other computer facilities to produce braille cassettes.

Carrying the Digicassette Around with You

The Digicassette is shipped to new owners in a hard plastic container filled with foam padding. Whenever the Digicassette needs to be shipped to Washington, D.C. it should be mailed in this container.

To carry the Digicassette around with you to school or to work, it is recommended that you purchase a sturdy carrying case, with several pockets. The pockets are useful for carrying the power supply, extra cassettes, and other personal belongings.

A carrying case with a shoulder length handle is preferred by most people. It is also recommended that you obtain two pieces of 1 inch to 1 1/2 inch foam padding to put inside the carrying case to cushion

the Digicassette from the external shock of accidental impact with objects in the environment, such as the floor, doorways, and other people.

To put the Digicassette in the carrying case, follow these steps:

1. Hold the Digicassette with one hand on the side where the battery plugs in.
2. Open the carrying case and insert your hand between the 2 pieces of foam.
3. Place the Digicassette into the carrying case between the the 2 pieces of foam in such a way that the smooth side of the Digicassette is touching the bottom of the carrying case. The smooth side is the side nearest the braille writing keys and the side that does not have the buttons for controlling the Digicassette, the counter-buttons, or the holes for the battery supply and the other external devices.

It is very important that your Digicassette does not rest on any of its buttons or keys when it is being carried around or stored because the constant pressure on the buttons could cause your machine to malfunction.

4. Finally, put the battery supply and your cassettes into a different pocket in the carrying case so that they don't scratch or harm the Digicassette.

Review

Before proceeding to the next section of this manual, review the functions of the different parts of the Digicassette as described

in this section. Without looking at your manual, you should be able to locate and understand the function of: the keyboard, braille display, touch control switch, cassette holder, four jacks, mode selector button, cassette ejector button, pause button, tape control button, volume control, internal microphone, braille tape counter, and multi-pin connector. Make sure also that you understand the rules for charging and use of batteries with your machine.

II. Playback or Reading a Braille Tape

As you work through this section, you should have a Digi-cassette and prerecorded braille tape on hand. Attempt to perform each step as you read.

Step-by-Step Directions

1. Place machine flat on table.
2. Make sure the mode selector is in the out position.
3. Push in the cassette ejector button, place a cassette in the holder, and close the lid.
4. Push tape control backwards (away from you) and press and release the transfer key to rewind tape.
5. When tape is rewound, pull tape control button to middle (off) position.
6. Pick machine up and turn it on its right side, being careful not to press the counter button. While holding the Digi-cassette in this position, push tape control button in until it locks.
7. Return machine to flat position.
8. Press and release transfer key. (Machine is searching for braille).
9. When you hear a long tone from the machine, press and release the review key. The tone should stop.
10. Continue to press the transfer key, waiting for a long tone. Then press the review key so that the tone stops, and once again press in the transfer key. Eventually

you will hear a rattling noise and a short beep after pressing the transfer key. This means that braille is ready to be read.

11. Read the first line on the display.
12. After reading the first line, touch the touch control switch. This will bring a new line of braille onto the display. Note that words may be carried over from one line to the next, i.e., the first character of a word may be presented at the end of one line, while the rest of the word appears on the next line.
13. After ten lines have been read, a beep will be heard.
14. Press the touch control switch after beep is heard.
15. After a short pause, during which the next block is transferred, the first line of braille from the new block will be displayed.
16. Continue reading as desired.
17. If you wish to reread a block you have just completed, press the review key. This will make your display blank. Then touch the touch control switch and begin rereading the block.
18. To turn off the Digicassette, push tape control button in firmly and release it.
19. To read a text known to begin at a certain tape counter number, rewind tape completely.
20. Push the tape control button forward (toward you) in fast forward position and hold it there.

21. Press the top counter button and check the braille display. The counter number should read 000 if you are at the beginning of the tape. If you have completely rewound the tape, and the number read is not 000, set the counter by pressing both counter buttons simultaneously. Then, by pressing the top counter button alone, and reading the display, check your number reading.
22. While still holding the tape control button in the fast forward position, press and release the transfer key. (The tape is now moving forward.)
23. By pressing the top counter button repeatedly, you can read the counter numbers on the braille display as the tape moves.
24. Read the braille counter numbers displayed until you are about two or three counter numbers away from the desired point. (Example: if your goal is 015, you should stop at 013).
25. Press the bottom counter button to erase the number on the display.
26. Return the tape control button.
27. As explained in steps 7-10, proceed with playback process.
28. To skim the first lines of blocks, press the review key when the first line of braille of a block has been displayed. Then release the review key and press and release the transfer key.

This will move the tape to the beginning of a new block, without requiring you first to read through an entire undesired block.

III. Recording (Writing) Braille

Follow the instructions in this section, using your Digicassette and a blank cassette tape.

Step-by-Step Directions

1. Place the Digicassette flat on a table.
2. Make sure mode selector button is in the out position.
3. Push cassette ejector button, place cassette in the holder, and close lid firmly.
4. Push tape control button backward (away from you) to rewind position and press and release transfer key. (Tape is rewinding).
5. After tape has finished rewinding, return the control button to the middle (off) position, then press both tape counter buttons at the same time to set the tape counter at 000.
6. To check the counter numbers, press the top counter button. The number 000 should appear on the display.
7. Press the bottom counter button to erase the number from the display. The counter button is now set for this particular tape. Be sure not to accidentally press both counter buttons at once, or the count will be lost.
8. To fast forward past the leader of your tape, pull the tape control button forward (toward you) and hold it there. Press and release the transfer key. (The tape is running forward).

9. After approximately two seconds, or when the counter reads 003, return the tape control button to the middle (off) position.
10. Push tape control button in until it locks into position (You are now ready to braille).
11. Begin brailling material. When you have brailled 116 characters (counting spaces) a short beep will be heard. This means that you have only four more characters to braille before you reach the end of the 120-character block.
12. When the 120th-character has been brailled, the block is complete and it is impossible to braille any more characters. No characters brailled after this point will appear on your display.
13. If you wish to review the block you have just brailled, press and release the review key. (The display will then be blank).
14. Press the touch control switch, and the first 12 characters of the block will appear on the display.
15. After checking a line, move to the next line by touching the touch control switch. Read through the entire block in this way.
16. If you wish to correct an error, press the back space/ correction key repeatedly until the error just disappears off the right end of the display. (Press the back space/ correction key slowly and evenly. Do not attempt to back-space rapidly).

17. When the error has disappeared, braille the correct character.
18. Press the touch control switch twice, and the corrected line will appear.
19. When you have reviewed the entire block, a short beep will be heard. You are now ready to transfer this block to the cassette tape. If the machine is turned off before the block has been transferred, this block will not appear later when you play back the tape.
20. Press the transfer key. You will then hear a short beep, which means that this block has now been transferred. You are now ready to braille another block.
21. Repeat steps 11-20 until you have brailled all the desired material.
22. If you do not have enough to finish a block, enter braille characters or blank spaces to complete the block. Then press and release the transfer key.
23. If you want to repeat a block, do not braille it a second time. Simply repeat the first character of the block and press the backspace/correction key twice. You will hear a short beep. Then press and release the transfer key, and you will hear another beep, indicating the repeated block has been transferred to the tape.
24. If you wish to record at a given counter number on the tape, or where you stopped recording at your last session, fast forward the tape, reading the counter numbers, to a point two or three counter numbers before your last block of braille.

25. Play the tape until the last line of the previously-recorded block has been displayed.
26. Press and release the tape control button.
27. Without tilting the machine, push the tape control button in until it locks in place.
28. Space two spaces and begin recording.

Illustration of Digicassette Blocks

The illustration on the next page depicts what is meant by a block of braille. On the Digicassette, of course, only one 12-cell line can be read at a time. In reading, you would progress through the block, touching the touch control switch at the end of each line to bring a new line onto the display. As the last line is presented, you hear a beep. When you touch the touch control at the end of this final line, there is a pause, and then the first line of the new block appears.

As you record a braille block, each new character appears to the right of the last one. The display is full when you have written 12 characters. When you write the 13th character, the first character of the block disappears from the left end of the display. This process continues, so that when you have written the full 120-character block, only the last 12 characters written are displayed. A warning beep is heard as you write the 116th character. After the 120th character, you must transfer the completed 120-character block before writing more braille characters. After this completed block is transferred, a second beep will be heard, signaling you to begin the new block.

A block of braille looks like this in the reading mode:

```
   1 2 3 4 5 6 7 8 9 10 11 12
 1 x x x x x x x x x x  x  x
 2 x x x x x x x x x x  x  x
 3 x x x x x x x x x x  x  x
 4 x x x x x x x x x x  x  x
 5 x x x x x x x x x x  x  x
 6 x x x x x x x x x x  x  x
 7 x x x x x x x x x x  x  x
 8 x x x x x x x x x x  x  x
 9 x x x x x x x x x x  x  x (beep)
10 x x x x x x x x x x  x  x (transfers next block)
```

A block of braille looks like this in the braille (writing) mode:

```
   1 2 3 4 5 6 7 8 9 10 11 12
 1 x x x x x x x x x x  x  x
 2 x x x x x x x x x x  x  x
 3 x x x x x x x x x x  x  x
 4 x x x x x x x x x x  x  x
 5 x x x x x x x x x x  x  x
 6 x x x x x x x x x x  x  x
 7 x x x x x x x x x x  x  x
 8 x x x x x x x x x x  x  x
 9 x x x x x x x x x x  x  x
10 x x x x x x x x (beep) x x x x (press transfer) (beep)
```

IV. Audio Recording and Playback

Audio Recording

1. Place machine flat on table.
2. Make sure the mode selector is in the in position.
3. Push cassette ejector button, place cassette in the holder, and close lid.
4. Push tape control button backward (away from you) to rewind tape.
5. Press and release both counter buttons. This will set your counter at 000.
6. Pull the tape control button all the way forward (towards you) and leave it there for about 2 seconds to get past the leader. Then release the tape control button.
7. Push the tape control button in until it locks.
8. You are now recording sound.
9. At the end of recording, push the tape control button in and release it.

Audio Playback (Listening)

1. Place machine flat on table.
2. Push mode selector in.
3. Push tape control button backward (away from you) to rewind to the beginning.
4. Pull tape control button to the middle position.
5. Pick the machine up and turn it onto its right side. Push tape control button in until it locks in place.

6. Return machine to flat position.
7. The tape will now be playing.
8. Volume control may be turned to adjust sound level.
9. To turn off the Digicassette, push the tape control button in and release it.

V. Alternating Braille and Sound

In some cases, you may want to record braille and sound during the same session. It is not possible, with this machine, to record braille and sound at the same time. You may, however, record in braille and then switch to sound for a while, and then back to braille. Read the directions carefully before trying this. Then practice alternating braille and sound, both in recording and playback, with a cassette tape.

To Change from Sound to Braille

It does not matter whether the machine is in sound recording or playback mode. If you want to change to braille, simply put the mode selector button in the "out" position. The tape will stop immediately and will be ready for braille use. If the machine is in the playback mode, press the transfer key and/or review key until braille appears. If the machine is in the recording mode, wait for 3 to 5 seconds. Then begin writing braille.

To Change from Braille to Sound

A. In playback, press the transfer key and immediately push the mode selector button in.

B. In recording, press the space key once, and then press the backspace/correction key twice. You will hear a beep when the backspace/correction key is pressed the second time. Finally, press the transfer key and push the mode selector button in: (Note that this can only be done at the beginning of a recording session or after a completed block. Never attempt to change from braille to sound in the middle of a block, or the braille portion of the block will be lost.)

VI. Machine Maintenance

Cleaning: The Digicassette, like a conventional cassette recorder or player, needs periodic cleaning. Your machine should be cleaned after every 20 hours of use with denatured alcohol on a cotton swab.

When the Digicassette is sitting in front of you in the surfaces to be cleaned are on the inside left edge of the cassette holder when the lid has been raised. These include: a rubber roller; a neighboring, vertical pin known as the capstan; and the recording and playback head (that moves when the tape control button is pushed). Special cassette tapes for cleaning are also available for use with any cassette recorder. However, a more thorough cleaning job may be done with the alcohol and the cotton swab.

Temperature Exposure: The touch switch of the Digicassette may not operate in low humidity (dry conditions) or may become over sensitive in dampness or after sudden changes of temperature (such as transfer from a cold car to a warm classroom). Avoid extremes in humidity and temperature or sudden changes of temperature whenever possible. If your machine is not working well immediately after such a temperature change, leave the machine alone for 15 to 30 minutes before attempting to use it again.

Battery Replacement: Even rechargeable batteries periodically require replacement. If your batteries are not recharging after your Digicassette has been plugged into an electrical outlet for eight hours, try replacing the batteries. Be sure the batteries you obtain are rechargeable.

If you have persistent trouble with the batteries, you may need to check for low voltage in the batteries. To do this you need a battery level meter and a screwdriver. First, unplug the power supply. Use the screwdriver to remove the screws which secure the lid to the machine.

Once you have removed the screws, the lid comes off easily.

Inside the machine you should notice a silver box with holes in it. This is the tape recorder. On the side of the tape recorder nearest the inside of the machine, is a small pushbutton. Use your screwdriver to push in this button and the battery pack with the four batteries should pop out of the machine.

Inside the Digi cassette are four nickel-cadmium batteries that provide six volts to operate the machine. Measure the voltage of each battery. You need at least a total of 6 volts to operate the machine; however, when it is fully charged, the total voltage reading will be between 8.5 - 9 volts. All four batteries have to be at the same voltage level for the machine to operate properly. If you have access to a battery charger, you can easily match the voltages in all of the batteries. If you do not have a battery charger, you will need to replace all the batteries at one time to insure their voltages match.

VII. When Things Go Wrong

Described below are some of the more frequently encountered problems found by users of the Digicassette. When you are having trouble with your machine, look through this section and try any suggested solutions to your problem. This may save a great deal of time, expense and frustration in sending the machine for unnecessary repairs. However, if you cannot solve the problem you are having with your Digicassette, you should call the manufacturer in Washington, D.C. for his advice. His phone number is: 202-857-0684. He may ask you to mail your Digicassette to him at this address: ELINFA, Inc., Suite 1114, 1725 K Street, N.W., Washington, D.C. 20006. When mailing your Digicassette, be sure to package it carefully in the heavy plastic carrying case it arrived in.

General Operation and Maintenance Problems

1. Key tops coming off: The key tops on your counter buttons and keyboard are removable, and may slip off accidentally. Beneath the key top is a spring, which may also come off when the key top is removed. If this should happen, replace the spring, small end up. Then replace the key top on top of the spring. Note that the key top has slots on each side to orient it properly to the base of the key.

2. Jammed cassette holder: You may find that your cassette holder sometimes does not open when you press the cassette ejector button. This problem can be temporarily solved by placing your fingernail or other small wedge under the lid and pulling upward, while pressing the ejector button. This problem is often caused by a loosening of the two screws that causes the tape recorder to shift around in the case. These screws are located to the right of the cassette holder. As soon as possible, you should center the tape recorder underneath the opening and use a screwdriver to tighten these screws.

3. Failure to fast forward or rewind: This may be especially likely to happen in the braille mode. If the machine does not seem to be fast-forwarding or rewinding, and the tape is not already completely on one reel, slowly return the tape control button to the neutral position, and then press it again to fast forward or rewind. Remember that you must also press the transfer key in order to move the tape in the braille mode. If the tape still does not move, you should remove it from the machine, and check to see whether or not the tape itself has become tangled or broken.

4. Failure of tape control button to press in: You may find that your tape control button refuses to press in for playing or recording of a tape. If this happens, press the cassette ejector to open the holder. Remove the cassette and slide it in again. Then close the cassette holder lid firmly, and try again to press in the tape control button. Also, check to make sure that the cassette tabs on the edge of the cassette have not been removed. If the tabs have been removed, the cassette can not be used for recording

purposes.

5. Long tone: If your machine sounds a constant long tone while in use, try the following: (a) press and release the review key; (b) turn the Digicassette off and then on again; and (c) if all else fails, plug the machine into an electrical outlet, and do not use for at least 1/2 hour. Then try using the machine again while still plugged in.

Common Problems Encountered While Using the Digicassette in the Braille Mode

1. Extra or uneven dotting: You may find that your machine is (a) consistently producing extra dots; (b) leaving out dots; or (c) displaying uneven dots. If any of these problems occur consistently, the pins which form the dots of the braille cells probably need adjustment or replacement. This means that your machine will have to be repaired. You can test your machine to find out whether or not all pins are working by brailling a complete 12-cell line of six-dot cells and then checking the display. You may find some mistakes in your brailling while you are getting used to the Digicassette simply because the touch is different from that of a braille writer. If you find that the braille dots are not distinct enough, their height can be adjusted by the ELINFA company in Washington.

2. Skipped lines: Since your touch control switch is activated by moisture from your hands, you may find that your machine sometimes skips lines at the slightest touch or even when you have not yet touched the touch control. If this happens, try washing your hands and drying them very thoroughly before continuing to use your machine. If, on the other hand, you find that the touch control

switch changes lines only after several pressings, try wetting your hands slightly or applying hand lotion. If either problem continues over three or four sessions, you should have your machine checked. Static electricity will also affect the touch control switch.

3. Plays back nonsense symbols: If one block consists partly or completely of nonsense symbols, continue reading to the next block. If this happens with several blocks on the same tape, try reading another braille tape. If this tape also is displayed as nonsense symbols, and the problem is not in your battery strenth or cord connection, your machine is probably in need of repair. If this problem occurs with only one tape, that particular cassette is probably damaged.

4. Long tone at the end of a played block: If this occurs only when you are playing a tape, and the problem is not in your battery strength or cord connection, proceed as follows: (a) press and release the review key. This will make the display blank. (b) Press the touch control switch. If an undamaged block of braille appears, continue reading. (c) If nonsense symbols appear, press and release the review key again; then press and release the transfer key. This should skip the machine to the next block of braille. If the machine continues to sound a long tone at the end of each block, try another tape in order to find out whether it is your machine or a particular cassette tape which is damaged.

5. Repeated blocks: You may find that a block which you intended to write only once appears twice on the tape. This may be because you reviewed a block immediately after transferring it onto the tape and then entered it onto the tape again by touching the

transfer key. It is probably best not to review, while still in the record mode, a block which you have just transferred onto the tape. If you must review a previously transferred block, press your review key again after reading the block. This will make your display blank so that you can write a new block without unwanted repetition.

6. Unrecorded blocks: You may find that a block of braille did not record. Remember that you must push the transfer key at the end of each block and that you must do so before turning off the machine. Otherwise, the last block written will not be recorded on the tape. Remember also that you must move, by fast forwarding, past the leader of a tape, as braille written on the leader will not be recorded. If you have followed these directions, and the mode selector was in the out position when you wrote, your machine should be checked if it is failing to record blocks of braille.

7. Nonsense symbols in backspacing: You may find that when you are backspacing to correct an error, the whole line being backspaced turns into nonsense symbols. If you are still able to keep track of the cell in which the error occurred, simply backspace until that cell disappears, ignoring the nonsense symbols. Once you have made your correction and have reviewed the block, the correct line of braille will reappear on the display. If you find the nonsense symbols too distracting, stop backspacing. Press and release the review key and read again through the block to the line in need of correction. Begin backspacing again very slowly. The line should then be backspaced correctly. If nonsense symbols continue to appear during backspacing, you should have your machine repaired by the ELINFA Company.

Sound Playback and Recording

Volume: Your machine does not necessarily have automatic volume level control. You will have to experiment with volume regulation for sound recordings. Try increasing the volume for audio recording if voices are muffled or inaudible. In some instances, you may wish to plug an external microphone into the appropriate jack, rather than relying on the built-in microphone.

Alternating Braille and Sound

Braille and sound appearing simultaneously: If in playing back a cassette, you find that braille and sound are being played simultaneously, try leaving a blank block between the braille and the audio blocks. Also, you may have recorded over a previously recorded tape. It is a good idea to bulk erase cassette tapes if you want to re-use a tape to avoid mixing old and new audio recordings on a tape.

VIII. Teaching Children to Use the Digicassette

To insure that the elementary and high school aged students learned how to operate and to use the Digicassette efficiently and without errors, project staff developed the following procedures, instructional program and criterion-referenced proficiency test for use by teachers.

Procedures

Our experience with young children and high school students has led us to suggest the following procedures for introducing school-aged children to the Digicassette.

1. Introduce machine as a new type of braille writer - a reference to computers and "space-age phenomenon," such as "star wars" and astronauts motivates many children to want to learn about the Digicassette.
2. Explain that the Digicassette is a braille writer, a reading machine, and tape recorder all in one machine.
3. Explore the machine with the child tactually, explaining all the different parts, buttons, and controls.
4. Begin the step-by-step instruction by demonstrating and practicing the procedures for braille reading. Branching steps may be necessary throughout the program, depending on the needs of the child. For example, a physically impaired blind child may need extra practice with and explanation about putting the cassette into the machine. Another child may need supplemental practice in remembering the sequence of

steps to follow to operate the Digicassette in a specific mode. Teachers will need to use their own judgment and knowledge of the child and his/her skills when planning to teach these new skills.

5. Continue teaching the different functions of the Digicassette using the step-by-step procedures outlined.
6. Before the child is allowed to use the machine at home for homework assignments, insure that the child can perform simple maintenance and problem-solving tasks, such as using the external battery supply.

Instructional Program. This program is written in an instruction-by-objective format. Teachers should utilize instructional techniques that are appropriate for individual children while following the outline of objectives.

Braille Reading

1. Student will open cassette door and insert cassette.
2. Student will point to "mode selector button" and push and release it for braille mode.
3. Student will point to "tape control button" and push it in while tilting machine on its side.
4. Student will point to "transfer" and "review" keys.
5. Student will press transfer and review keys until braille is displayed.
6. Student will point to braille display.
7. Student will point to touch control switch.
8. Student will read display and press the touch control switch to read next line.

Writing Braille

1. Student will open cassette door and insert cassette.
2. Student will point to "Tape control button" and demonstrate fast forward and rewind, on and off.
3. Student will fast forward leader tape for 2 seconds.
4. Student will point to mode selector button and demonstrate braille mode.
5. Student will put machine in record position.
6. Student will point to six braille keys and space key.
7. Student will braille characters until first beep is heard (116).
8. Student will braille four spaces or characters.
9. Student will point to transfer button and press it to record braille on tape.

Braille Reading Mechanics

1. Student will read braille characters from left to right in one sweeping motion with left and/or right index finger.
2. Student will lightly touch the touch control switch and lift finger off switch immediately before returning to read the next line.
3. A branching step may be necessary here. Have child hold hand in a tight fist with index finger extended. Have child practice reading braille with one index finger and lifting finger completely off the page at the end of the line.

Correcting Errors

1. Student will point to backspace/correcting key.
2. Student will point to braille error.

3. Student will backspace until error disappears.
4. Student will braille correct character.
5. Student will press review key twice.
6. Student will read corrected line.

Using Counter Buttons

1. Student will point to counter button, and counter reset button.
2. Student will demonstrate obtaining a counter reading.
3. Student will demonstrate erasing the counter reading.
4. Student will demonstrate resetting the counter.
5. Student will demonstrate finding a specific location on the tape.

Sound Recording and Playback

1. Student will open cassette door and insert cassette.
2. Student will point to "mode selector button" and push it in.
3. Student will playback pre-recorded sound tape.
4. Student will control volume with volume control dial.
5. Student will point to the record button and push it in.
6. Student will speak several words or phrases in order to record his own voice.

Problem Solving

1. Student will demonstrate three procedures for eliminating the high frequency noise, including,
   a) press review key
   b) turn machine off, then on
   c) plug in battery charger and wait 30 minutes before trying again.

2. Student will demonstrate three procedures for finding braille on a tape, including,

   a) fast forwarding the tape

   b) turning tape to the other side

   c) listening to tape in the audio mode.

Criterion-Referenced Proficiency Test

This test was developed for research purposes; however, it can be used to insure that the student has mastered the operations and the use of the Digicassette. This test can also be used to diagnose problems the student may be having in operating the machine.

A Criterion-Referenced Proficiency Test for Operating the Digicassette

Identification of Parts

1. Where is the front of the machine?
2. Where is the top of the machine?
3. Show me the cassette holder.
4. Show me the braille display.
5. Show me the touch control.
6. Show me the braille keyboard.
7. Show me the backspace/correcting key.
8. Show me the review key.
9. Show me the transfer key.
10. On the left side of the machine, show me the mode selector button.
11. Show me the playback/record button (on/off).
12. Show me how to fast forward.
13. Show me how to rewind.
14. Show me the cassette eject button.
15. Show me the volume control.
16. Show me the microphone.
17. On the right side, show me the counter button.
18. Show me the counter erase button.
19. On the back side, show me where you plug in the battery charger.
20. Show me how to read this braille tape: (child should proceed in the following manner)

    1. Insert cassette.
    2. Put mode selector button in "out" position.

3. Rewind tape to beginning.
4. Turn machine vertically.
5. Push in tape control.
6. Return machine to horizontal position.
7. Press transfer key.
8. Press review key.
9. Repeat steps 7 and 8 until braille appears.
10. Read braille.

21. Show me how to braille the ABC's: (child should proceed in the following manner)
    1. Insert cassette.
    2. Put mode selector button in "out" position.
    3. Fast forward tape past leader tape.
    4. Push in tape control.
    5. Type 116 braille characters plus four more.
    6. Press transfer key to record a tape.
22. Show me how to correct a mistake: (child should proceed in the following manner)
    1. Identify error.
    2. Press backspace key until incorrect letter disappears.
    3. Type the correct letter.
    4. Touch the touch control switch twice to read the correct line.
23. Show me how to fast forward a braille tape: (child should proceed in the following manner)
    1. Pull tape control button towards you.
    2. Hold button tnere.
    3. Press transfer key.
    4. Release at desired place.

24. Show me how to rewind a braille tape: (child should proceed in the following manner)
    1. Push tape control button away from you.
    2. Return to neutral position at desired place.
25. Show me how to set the tape counter at zero: (child should proceed in the following manner)
    1. At beginning of tape, press both buttons to set counter at "000."
26. Show me how to read a counter number: (child should proceed in the following manner)
    1. To indicate your place in a text, push the top button--numbers appear.
27. Show me how to erase the counter number: (child should proceed in the following manner)
    1. To clear the numbers, push bottom button.
28. Show me how to record sound: (child should proceed in the following manner)
    1. Push mode selector button "in".
    2. Machine remains in horizontal position.
    3. Push in tape control--machine is recording.
29. Show me how to playback a sound recording: (child should proceed in the following manner)
    1. Push mode selector button "in".
    2. Turn machine vertically.
    3. Push in tape control button.
    4. Return machine to horizontal position--machine playing.

30. How would you solve the following problems: What would you do if:

    A. A loud, continuous high-pitched sound occurs?

        1. First, press review key, if nothing happens. . .

        2. Turn machine off and then on, if sound still occurs,. . .

        3. Battery need to be charged; plug in battery charger, wait 30 minutes.

    B. What if there appears to be no braille on your tape?

        1. Fast forward the tape to find it.

        2. Turn tape to other side.

        3. Play the tape in the audio mode.

Other questions to ask:

1. What is the leader on a tape? (blank tape at beginning)
2. Can you record braille or sound on the leader tape? (no)
3. How many braille characters are there is a block? (120)
4. How many braille characters are there on the display? (12)
5. When you are brailling, when does the machine beep? (at 116th cell)
6. How many braille characters can you braille after the first beep? (4 more)
7. What happens after you braille 120 characters? (machine locks and you can't braille any more characters)
8. What do you have to do to be able to braille more than 120 characters? (press transfer key and wait for beep)
9. When you've finished brailling your assignment what do you have to do before you turn your Digicassette off? (braille blank spaces until you reach 120, then push the transfer button)

IX. The Digicassette and External Devices

Besides its function as a device for writing and recording in braille on cassette, the Digicassette can be used to communicate directly with other devices (calculators, other Digicassettes, computers), and the resulting dialogue can be recorded on cassette. The Digicassette is available in a model that enables it to communicate with other devices and in a model that does not. The difference between these two models is a single switch on the back rear panel of the Digicassette. This switch enables the machine to operate in manual and automatic modes. In the manual mode, the Digicassette performs exactly as it would without the switch. In the automatic position, the writing and reading positions are affected as follows:

(a) Writing: The block currently stored in the memory is recorded onto tape as soon as the 120th character has been entered (either from the keyboard or from another device).

(b) Reading: The material recorded on one cassette is transmitted to another device, block by block, without interuption.

This automatic mode is especially useful when using the Digicassette with computers, since it allows large quantities of information to be transferred and recorded without having to manually control the transfer button after each block of 120 characters. The switch slides upward for manual operation and downward for automatic operation.

A. Calculators

Certain Texas Instrument and Hewlett-Packard calculators can be modified by the ELINFA company to be used with the Digicassette. The modification of the calculator includes enclosing it in a larger

case, attaching a multi-pin connector to the case, and inserting a braille translation interface into the calculator. Once this has been done, the calculator can be connected directly to the right-hand side of the Digicassette and numbers and operations entered on the calculator will be displayed both on the calculator's visual display and on the Digicassette's braille display. The calculator can also be operated from the Digicassette's keyboard.

In order for the calculator to operate correctly with the Digicassette, the Digicassette must have the manual/automatic switch set to the automatic mode.

The Braille Code for Mathematical Functions. Although the calculator is used for higher level mathematical functions and operations, the Nemeth code is not used with the Digicassette's braille

keyboard. Instead,

1. The number keys 1 through 9 and 0 are represented by the first ten letters of the braille alphabet, without the braille number sign.
2. The decimal point key is represented by dot 6, and is added to the cell containing the number preceding the decimal.
3. The minus (negative) sign is represented by dot 3, and is added to the cell containing the number following the minus sign.
4. The remaining keys are represented in a way which is easy to remember.

Regardless of their function, the keys are assigned a letter of the alphabet, according to their position on the calculator's keyboard. For instance, if the calculator had three rows of keys, not including the number keys, the first key would be "k", the next "l", the next "m" and so on until all keys had a corresponding letter. The subtraction function is the braille character "th". The addition function is the braille character "wh". The multiplication function is the braille character "ed". The division function is the braille character "er".

When the calculator is modified by ELINFA, they will inform you of the braille character to be used for each key of your calculator.

Using the Calculator and the Digicassette

1. Connect the calculator with Digicassette by means of the

multi-pin connector on the right-hand side of the Digicassette and on the left-hand side of the calculator. Turn on the calculator (see your calculator user's manual). Switch on the Digicassette in the automatic writing (recording) mode, with the manual/automatic switch in the "down" position. Press the space key twice and touch the touch control switch once only. The number 0.00 will appear on the braille display.

2. To activate a key on the calculator keyboard, you can either press that key, or write the braille symbol for that key on the Digicassette. This braille symbol will immediately appear in the farthest cell to the right on the braille display and will be stored in the Digicassette's buffer memory.
3. Perform the mathematical operations as directed by the calculator's handbook.
4. To transfer the contents of the calculator's visual display to the Digicassette's braille display, press the space key twice and touch the touch control switch once only. The number visually displayed on the calculator will immediately appear on the braille display and be stored in the Digicassette's buffer memory. WARNING: if you touch the touch control switch more than once, a complete line of braille will be sent from the buffer memory to the braille display.
5. As soon as the buffer memory is full (120 characters), its contents will automatically be recorded on the tape. If this occurs in the middle of a transfer from the calculator's

display to the Digicassette's display, the calculator will wait until the recording operation has been completed and then complete the transfer.

6. To read the contents of the Digicassette's buffer memory, press the review key and use the touch control switch in the ordinary way. To resume operation with the calculator, first press the transfer key, then proceed.

B. Typewriter

The Digicassette can be interfaced with an IBM selectric typewriter allowing a blind person to type either in braille on the Digicassette's keyboard or in print on the typewriter's keyboard. A sighted typist who knows nothing about braille can type a text on the typewriter and the text will automatically be recorded in braille on the Digicassette. A blind typist can braille a text on the Digicassette and at the same time the text will be typed in print characters on a sheet of paper in the typewriter.

The ELINFA company will modify your IBM selectric typewriter by installing an electromagnetic driving system and an interface for the braille translation code. When modified, the Digicassette and the typewriter are connected together by means of a simple connector plug.

C. Computers

The Digicassette can be connected to computers, including microcomputers, by means of the computer interface. This device connects to the Digicassette at the multi-pin outlet. The computer interface converts braille characters into an asynchronous stream of serial characters which conforms to the CCITT V-24 and RS-232-C standards. The speed of character transmission and the code used by the external device are selected by the user, in order that any computer can accept the Digicassette output.

The interface is also directly connectable to standard telephone modems, enabling transmission over long distance telephone or specialized networks (such as TELEX).

D. Dialogue: Deaf/Blind Communication

Two Digicassettes can be connected together to allow a dialogue between deaf/blind persons or between deaf and blind persons.

To do this, the ELINFA company would need to supply the connector cable. This cable connects the two Digicassettes together at their multiple-pin outlet connection.

To operate in the dialogue mode:

(a) Connect two Digicassettes (A and B), using the appropriate cable.

(b) Set both machines to write (record), and slide the manual/automatic switch of each machine to automatic. Now write a message with one of the machines. No matter which machine is being used for writing, the braille characters will still appear on the braille displays of both machines at the same time and will be stored in the memories of both machines.

User A and user B alternate writing messages and replies with their respective Digicassettes..

(c) If user A wishes to interrupt the dialogue in order to correct a mistake or to reread a previous message, he must first press the backspace/correcting key. Then he can read or correct the braille contained in the memory of his Digicassette. User B will become aware of the interruption when he suddenly finds that his own braille display has been immobilized. If user B continues to write, the memory of his machine will store only the first three characters entered after the interruption occurred. The first two of these characters will appear on the braille display of Digicassette B, while the three stored characters will appear on the braille displays of both Digicassettes as soon as communication has been reestablished by user A. To resume communication, user A must press the transfer key.

It is quite possible to connect any number of Digicassettes together so as to have a dialogue between any number of people (for example, teacher and students, or blind and deaf-blind people); however, the ELINFA company would need to supply the appropriate connection plugs.

E. Copying Braille Cassettes

Although it is possible to copy braille cassettes with high quality duplicating equipment, most cassette duplicating machines do not do an adequate job of copying braille cassettes. It is possible,

however, to obtain a quality copy by connecting two Digicassettes together and by copying the contents of a braille cassette onto a blank cassette. To do this:

(a) Connect Digicassettes A and B with the connection plug. Digicassette A should contain a prerecorded braille cassette, and Digicassette B should contain a clean unrecorded cassette.

(b) Set Digicassette A for reading (playback), and slide the manual/automatic switch to automatic.

(c) Set Digicassette B for writing (recording), and note the following:

(1) If you wish simply to make a complete copy of the prerecorded cassette, use Digicassette B in the automatic mode.

(2) If you wish to proofread and correct the text before recording it, slide the manual/automatic switch of Digicassette B to manual. In this case, both machines will stop at the end of each block and the last 12 characters of that block will be displayed. To proofread, press the review key and read the block of information. Then press the transfer key to record the proofread block onto the tape and to transfer a new block into the buffer memory. Again the last 12 cells of the next block will be displayed.

(3) To make corrections, put the machine in manual mode, press the review key, proofread the block from the memory, make any necessary corrections and then record the block by

pressing the transfer key. This will also cause Digicassette A to transmit the next block of information to the buffer memory for reading.

(4) If you wish to record a block without proofreading or correcting, simply press the transfer key when the Digicassettes are in the manual mode. In the automatic mode, all the information records automatically.

(5) To erase a block, first press the backspace/correcting key, then the review key, and finally the transfer key.

X. GUIDELINES FOR TRANSCRIBERS

Transcribing Braille on the Digi cassette

S.C. Ashcroft and Joy Craig

The guidelines for transcribing braille onto cassette tapes for reading on the Digicassette should, whenever possible, conform to the same guidelines for transcribing conventional braille. However, many of those guidelines will not be possible to follow due to the one-line, 12-cell display of the PBR. Thus, the following special guidelines should be followed and transcribers are asked to suggest additional guidelines and/or revisions of these proposed guidelines.

The proposed guidelines are as follows:

1. Set tape counter at 000 when beginning a tape. Advance tape until counter indicates 002 or 003 before beginning to braille. Record on paper counter readings for all titles and headings which appear in a text and, when appropriate, provide this information in conventional braille form with each completed cassette tape.
2. A title or center heading should always be started in a new block of 120 characters. Thus, no title or center heading should appear within a 120 character block except at its beginning. Side headings or paragraph headings may appear. Side headings should be set off by three spaces preceeding and three spaces following. Paragraph headings should be preceeded by three spaces with the paragraph following without intervening spaces.

3. A new chapter should begin only at the beginning of a new block of characters.
4. To indicate the beginning of a new paragraph, leave three blank spaces.
5. End a block of characters only with a complete word. Do not divide a word between blocks of characters.
6. Following completion of a paragraph, if unused space remains in a 120 character block of characters, write "End par," if space allows, to signify the end of the paragraph. Fill additional unused spaces in a block with "continue to next block" when appropriate and/or "for" signs.
7. Whenever material such as outlines, lists, formulas, or arithmetic problems appear, (that is, material that cannot be faithfully reproduced in PBR form) provide supplemental material in conventional braille form to accompany the material presented on the Digicassette.